



This program was developed with a grant Arizona Game and Fish Department Heritage Fund

## Wetland Wildlife Habitat Field Study Grades 7-12

**Description:** Students use scientific methods and tools to collect and record baseline data on the diversity and abundance of plants and animals in two distinct habitats at Agua Caliente Park. Working in teams, students document the current conditions at the study sites at the edge of the wetland habitat and on the banks of a former pond that is now dry. The teams conduct point count surveys for wildlife and signs of wildlife. At the same two locations, students identify and count plants in 0.5 meter quadrat plots. Following the field study students compile results and use graphs and basic descriptive statistics to analyze the data they collected.

**Duration:** 2.5 hours

### Objectives:

- Students learn the concepts of environmental change and the potential impacts on species diversity and abundance.
- Students get hands-on experience using scientific methods for collecting and recording data and documenting study plots using GPS, digital cameras, soil moisture meters, soil and air thermometers, hygrometer, binoculars, hand lenses, and plant and animal identification guides.
- Students work as a team sharing tools and tasks and are successful in following written and verbal instructions.
- Students participate in a challenging field study experience and build observation skills.

### Vocabulary:

Abiotic	Biotic	Species Diversity
Abundance	Ecosystem,	Spring
Aquatic	Ground Water	Surface Water
Aquifer	Habitat,	Wetland
Baseline Data	Riparian	

### Equipment and Materials:

½ meter quadrat (5)  
 Data sheets: Site and Condition, Animals, Plants (2-4 sets per group)  
 Binoculars  
 Hand lenses (1/student)  
 Clipboards (10)/ Markers (10)  
 Dry-erase boards/markers (2)  
 GPS unit (5)  
 Daypack (5)  
 Photo I.D. Cards of common plants and animals (5 sets)

Digital cameras (5)  
 Soil Moisture Meter (5)  
 Soil Thermometer (5)  
 Hygrometer/Air Temperature (5)

### **Description of Activity:**

The teacher identifies 5 student teams (ideally this would be done before coming to the park). Each team is identified by a color and packs are labeled with corresponding color. In a shaded place in front of the Rose Cottage have the teams sit together with all teams gathered around instructor.

### **Introduction**

Welcome  
 Overview of the day  
 Ground rules and safety considerations

### **The story of change at Agua Caliente Park**

Define – Aquifer, Ground Water, Habitat, Riparian, Diversity, Abundance

### **What**

Student Teams conduct two types of surveys:

Wildlife Point Count  
 Plant Quadrat Plot

With each of these methods the students look first at diversity and then at abundance.

### **Why**

The work that the students do today contributes to a larger project that will give us all a better understanding of wildlife at the park. In this field study experience students use scientific survey methods and tools to get a “snapshot” or small sample of the habitat and the wildlife that occurs in that habitat. This same sampling method is repeated by other student groups and the data collected are compiled and made available to teachers and students.

### **How**

Describe and demonstrate the data collection methods for the *Site Location and Conditions*, *Animal Point Count*, and the *Plant Quadrat*.

During demonstration discuss and explain the importance of each test. For example: How might the temperature effect animal activity?

Students discuss and identify best the practices for viewing wildlife.

### **Begin Field Study**

Teams walk out to the Dry Pond. Instructor sets out the quadrat and shows each team to their site.

Teams work through the steps to collect and record data at the study sites.

Teams inventory equipment and replace to the packs before moving with the instructor to the main pond. (If there is time for a snack or lunch break this would be the time to do that.)

Teams repeat the process of collecting and recording data at their assigned sites along the banks of the main pond.

### **Sequence for Data Collection at Each Site**

#### **1) Site Location and Conditions**

### Equipment – Site Location and Conditions Data Sheet

Clipboard and Markers, GPS Waypoint, Camera, Soil Moisture Meter, Soil Thermometer, Hygrometer/Air Temperature

- Take reading of GPS Waypoint Averaging and record on data sheet.
- Students take photos of the flag and quadrat, and use the video function in the camera to record a visual of the location. Start the video looking out towards the pond and turn to the right to record the landscape until reaching the starting point. Write the # of the video on the space provided on the data sheet.
- Record each photo in the Site Location and Condition data sheet.
- Take air temp, relative humidity, soil temp, and soil moisture. Record each measurement on the data sheet.

### **2) Animal Point Count**

Equipment – Animal Point Count Data Sheets (2) (live animal, animal signs)

Clipboards and Markers, Binoculars (each student), Hand lens (each student), Camera, ID cards

- Teams do a 10-minute point count of animals and signs of animals and record observations and any photos on the data sheets.
- If students can't identify the species using the ID guides, they may just assign a name (i.e. duck 1) describe it in the notes, and take a photo if possible.
- Record the number of the photo in the photo column on the data sheet.

### **3) Plant Quadrat**

Equipment – Plant Quadrat Data Sheet

Clipboards and markers, Quadrat, Hand lens – each student, Camera, ID Cards

- Instructor places the quadrat plot and reminds students – “do not step in the plot”.
- Students take photos of the plot: 1) looking down at the plot. 2) Lift the plot square up and one student takes a photo looking up through the square.
- Record the photo numbers on the data sheet.
- List Plant species – students write down the common name for any plant found within the quadrat or as a canopy over the quadrat. If species is unknown, create a name for the plant name such as grass #1, take a photo of grass #1 and record the photo number on the Plant Quadrat Data sheet.
- Count the number of each type of plant found in the quadrat.
- Looking at the 16 points of intersection count how many times each plant is found at an intersection point and record in the Plant Species Frequency column. Plant Species Frequency calculation will be done later at wrap up.

Check equipment and put in the pack before leaving the site.

Return to the Rose Cottage.

### **Wrap Up**

- Student teams have the opportunity to use photo record and consult with Instructor and reference manuals to identify any plant and animals that were not completed in the field.
- Students share observations with other teams.
- Instructor explains and demonstrates Plant Species Frequency calculations.
- Student teams complete the calculations and record on Plant Quadrat Data Sheet.

- Instructor provides examples of histograms, species accumulation curves, mean, median, mode, range, standard deviation and variance. Be able to add the mean, and two standard deviations from the mean to the histogram.
- Students work individually to complete at least one histogram from the data they collected.

**Extensions:** Teachers have the option to use the data from collected by their students and other students for further study. Following the field study trip the NRPR Instructor will send an email with a link to the site where the data is compiled and stored.

**Late Arrivals:** This field study program is designed for 2.5 hours of instruction. If the group arrives late or needs to leave early there will be less time allocated to the wrap up activities. Following the field study trip the NRPR Instructor will send an email with a link to the site where the data is compiled and stored.

**Linked to Arizona Academic Standards:**

Science G7 S1: C1- PO1, 3; C2- PO1, 3-5; C3- PO1-7; C4- PO1, 3-5. S2: C2- PO1-3. S3: C1- PO1-3; C2-PO1-2. S4: C3- PO1-2, 4-5. Math: 7.SP. B3-4. Science G8 S1: C2- PO1, 4-5; C3- PO1-6; C4- PO1-5. S2: C2- PO1-4. S3: C1- PO1-2. Math: 8.SP. A1-2. Science HS S1: C1- PO1, 4; C2- PO1, 4-5; C3- PO1-2, 6-7; C4- PO1-4. S2: C2- PO1-4. S3: C1- PO1-5; S4: C3- PO1-3; C4- PO4. Math: HS.S-ID.A.4.

**Next Generation Science Standards:**

**Practices:** This Field Study naturally supports the following Science and Engineering Practices: Asking questions (for science) and defining problems (for engineering); Planning and carrying out investigations; Analyzing and interpreting data; Using mathematics and computational thinking; Constructing explanations (for science) and designing solutions (for engineering); Engaging in argument from evidence; Obtaining, evaluating, and communicating information.

**Crosscutting concepts:**

This Field Study naturally supports the following Crosscutting Concepts:

Patterns (MS-LS2-2), Cause and Effect (MS-LS2-1), Stability and Change (MS-LS2-5)

Follow-up opportunities/Further investigation support(s) the following Crosscutting Concepts:

Energy and matter; Scientific Knowledge Assumes an Order and Consistency in Natural Systems, Science Addresses Questions about the Natural and Material World.

**Disciplinary Core Ideas:**

This Field Study addresses the following Disciplinary Core Ideas:

LS2.A Interdependent relationships in ecosystems; LS2.B Cycles of matter and energy transfer in ecosystems; LS2.C Ecosystem dynamics, functioning, and resilience; Follow-up opportunities support the following Disciplinary Core Ideas: LS1.A Structure and function; LS1.B Growth and development of organisms; LS1.C Organization for matter and energy flow in organisms; LS2.D Social interactions and group behavior; LS4.B Natural selection; LS4.C Adaptation